General

Guideline Title

Heart failure - systolic dysfunction.

Bibliographic Source(s)

University of Michigan Health System. Heart failure - systolic dysfunction. Ann Arbor (MI): University of Michigan Health System; 2013 Aug. 24 p. [36 references]

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: University of Michigan Health System. Heart failure - systolic dysfunction. Ann Arbor (MI): University of Michigan Health System; 2006 Sep. 18 p. [15 references]

Recommendations

Major Recommendations

Note from the University of Michigan Health System (UMHS) and the National Guideline Clearinghouse (NGC): The following guidance was current as of August 2013. Because UMHS occasionally releases minor revisions to its guidance based on new information, users may wish to consult the original guideline document for the most current version.

Note from NGC: The following key points summarize the content of the guideline. Refer to the full text for additional information, including detailed information on dosing and cost of drugs as well as information on other interventions considered.

The strength of recommendation (I-III) and levels of evidence (A-D) are defined at the end of the "Major Recommendations" field.

Key Points

Diagnosis

- Ejection fraction (EF) evaluated to determine the etiology as systolic dysfunction rather than diastolic dysfunction or valvular heart disease *[IA]*.
- Serum B-type natriuretic peptide (BNP) to help determine if dyspnea is due to heart failure (HF) *[IC]*.

Pharmacologic Therapy (see Table 1 in the original guideline document)

- For patients with systolic dysfunction (EF <40%) who have no contraindications:

- Angiotensin-converting enzyme (ACE) inhibitors for all patients *[IA]*.
- Beta blockers for all patients except those who are hemodynamically unstable, or those who have rest dyspnea with signs of congestion *[IA]*.
- Aldosterone antagonist (low dose) for all patients with symptoms of HF or with a history of hospitalization for HF *[IA]*.
- Isosorbide dinitrate-hydralazine combination for symptomatic HF patients who are African-American *[IA]*.
- Diuretics for symptomatic patients to maintain appropriate fluid balance *[IC]*.
- Angiotensin receptor blockers (ARBs) as a substitute for patients intolerant of ACE inhibitors *[IA]*.
- Digoxin only for patients who remain symptomatic despite diuretics, ACE inhibitors and beta blockers or for those in atrial fibrillation needing rate control *[IA]*.

Device Therapy

- Implantable defibrillators considered for prophylaxis against sudden cardiac death in patients with EF ≤35% *[IA]*.
- Bi-ventricular pacemakers considered for patients requiring defibrillators who have symptomatic HF and QRS durations ≥120 msec *[IA]*.

Caution

HF patients on multiple medications are at risk of potential drug interactions and side effects. For example, the risk of hyperkalemia is increased in patients with renal insufficiency treated with an aldosterone antagonist and an ACE inhibitor.

Definitions:

Levels of Evidence

A. Randomized controlled trials
B. Controlled trials, no randomization
C. Observational trials
D. Opinion of expert panel

Strength of Recommendation

I. Generally should be performed
II. May be reasonable to perform
III. Generally should not be performed

Clinical Algorithm(s)

The following algorithms are provided in the original guideline document:

- Identifying Systolic Heart Failure
- Device Referral Algorithm

Scope

Disease/Condition(s)

- Left ventricular systolic dysfunction
- Heart failure (HF)

Guideline Category

Diagnosis

Evaluation

Treatment

Clinical Specialty

Cardiology

Family Practice

Geriatrics

Internal Medicine

Intended Users

Advanced Practice Nurses

Nurses

Pharmacists

Physician Assistants

Physicians

Guideline Objective(s)

- To improve mortality and morbidity for patients with heart failure (HF)
- To present a framework for treating patients with HF

Target Population

Adult patients with left ventricular systolic dysfunction

Interventions and Practices Considered

Diagnosis/Evaluation

1. Evaluation of ejection fraction (EF)
2. Measurement of serum B-type natriuretic peptide (BNP) levels

Management/Treatment

1. Pharmacologic therapy:
    - Angiotensin-converting enzyme (ACE) inhibitors
    - Beta blockers
    - Aldosterone antagonist (low dose)
    - Isosorbide dinitrate-hydralazine
    - Diuretics
    - Angiotensin receptor blockers (ARBs)
    - Digoxin
2. Device therapy:
    - Implantable defibrillators
    - Bi-ventricular pacemakers

Major Outcomes Considered

- Mortality and mortality associated with heart failure (HF)
- Symptom relief
- Rate and length of hospitalization
- Drug interactions and side effects
- Quality of life

Methodology

Methods Used to Collect/Select the Evidence

Hand-searches of Published Literature (Primary Sources)

Hand-searches of Published Literature (Secondary Sources)

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

The literature search for this project started with the results of literature searches performed in 1998 and 2005 for earlier versions of this guideline. A new search was conducted prospectively using the major keywords of: congestive heart failure, guidelines, controlled trials, cohort studies, published 4/1/05 to 3/1/11, adults, English language on MEDLINE. Terms used for specific topic searches within the major keywords included: electrolytes; functional or stress testing; catheterization; electrogram; left ventricular ejection fraction measurement: echocardiography, sestamibi, radionuclide ventriculogram; natriuretic peptides (A-,B- [BNP], and C-type), troponin, biomarkers; education; dietary restriction; salt substitutes; exercise; devices: ICD, biventricular pacing, AICD, implantable cardiodefibrillator, LVAD; revascularization; diuretics; angiotensin converting enzyme (ACE) inhibitors; angiotensin receptor antagonist/blocker; aldosterone antagonists; digoxin; beta blockers; vasodilators (e.g., nitrates, hydralazine); calcium channel blockers; inotropic agents; anti-arrhythmics; lipid lowering drugs; fish oil, anticoagulants, anti-thrombotics and antiplatelet agents; influenza vaccination; pneumovax immunization; coenzyme Q10; NSAIDs; narcotics; vitamin D; other complementary and alternative medicine: nutritional supplements, herbal remedies (e.g., hawthorn), chocolate, alcohol, tai chi; disease based management; telemanagement (diuretics & weight); comorbid conditions: renal insufficiency, atrial fibrillation, anemia, sleep apnea, diabetes, depression, erectile dysfunction, dementia, arthritis, sinus node inhibition (beta blockers), hypernatremia (vasopressin antagonists); gender differences; racial differences and pharmacotherapy; end of life considerations, palliative care; any other reference identified by the major keywords and not included in results of specific topic searches. Specific search strategies are available upon request.

The search was conducted in components each keyed to a specific causal link in a formal problem structure (available upon request). The search was supplemented with very recent clinical trials known to expert members of the panel. Negative trials were specifically sought. The search was a single cycle.

Number of Source Documents

Not stated

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Levels of Evidence

A. Randomized controlled trials

B. Controlled trials, no randomization
C. Observational trials
D. Opinion of expert panel

Methods Used to Analyze the Evidence

Review of Published Meta-Analyses

Systematic Review

Description of the Methods Used to Analyze the Evidence

Not stated

Methods Used to Formulate the Recommendations

Expert Consensus

Description of Methods Used to Formulate the Recommendations

Conclusions were based on prospective randomized clinical trials (RCTs) if available, to the exclusion of other data; if RCTs were not available, observational studies were admitted to consideration. If no such data were available for a given link in the problem formulation, expert opinion was used to estimate effect size.

Rating Scheme for the Strength of the Recommendations

Strength of Recommendation

I. Generally should be performed
II. May be reasonable to perform
III. Generally should not be performed

Cost Analysis

A formal cost analysis was not performed and published analyses were not reviewed.

Method of Guideline Validation

Internal Peer Review

Description of Method of Guideline Validation

Drafts of this guideline were reviewed in clinical conferences and by distribution for comment within departments and divisions of the University of Michigan Medical School to which the content is most relevant: Cardiology, Family Medicine, General Medicine, and Geriatric Medicine. The final version was endorsed by the Clinical Practice Committee of the University of Michigan Faculty Group Practice and the Executive Committee for Clinical Affairs of the University of Michigan Hospitals and Health Centers.

Evidence Supporting the Recommendations

Type of Evidence Supporting the Recommendations

The type of supporting evidence is identified and graded for each recommendation (see the "Major Recommendations" field).

Conclusions were based on prospective randomized controlled trials (RCTs) if available, to the exclusion of other data; if RCTs were not available, observational studies were admitted to consideration. If no such data were available for a given link in the problem formulation, expert opinion was used to estimate effect size.

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

Appropriate management of patients with heart failure (HF)

Potential Harms

- Heart failure (HF) patients on multiple medications are at risk of potential drug interactions and side effects. For example, the risk of hyperkalemia is increased in patients with renal insufficiency treated with an aldosterone antagonist and an angiotensin-converting enzyme (ACE) inhibitor.
- Many of the medications appropriate for heart failure (ACE inhibitors, angiotensin receptor blockers, aldosterone antagonists, digoxin) can affect potassium or can be affected by potassium levels and renal function. Vigilant monitoring is required.

Contraindications

Contraindications

- Angiotensin-converting enzyme (ACE) inhibitors and angiotensin receptor blockers (ARBs) may cause hyperkalemia in the presence of renal failure and should be avoided or used only with great caution among patients with creatinine (Cr) >2.5, glomerular filtration rate (GFR) <30, or potassium >5.0. Both classes of agents are contraindicated in patients with bilateral renal artery stenosis, unilateral renal artery stenosis with solitary kidney, pregnancy, and allergies. Angioedema can occur rarely with either class of agent.
- Beta-blockers:
  - Absolute contraindications: heart block, bradycardia, severe reversible airway disease.
  - Relative contraindications: rest dyspnea with signs of congestion, hemodynamic instability. Once these issues have resolved, beta blockers may be added to the chronic regimen.
- Isordil-hydralazine cannot be used concomitantly with phosphodiesterase inhibitors (e.g., sildenafil, tadalafil, and vardenafil).
- The use of phosphodiesterase type 5 (PDE-5) inhibitors is contraindicated in patients taking nitrates due to profound hypotension that may develop.

Qualifying Statements

Qualifying Statements

These guidelines should not be construed as including all proper methods of care or excluding other acceptable methods of care reasonably directed to obtaining the same results. The ultimate judgment regarding any specific clinical procedure or treatment must be made by the physician in light of the circumstances presented by the patient.

Implementation of the Guideline

Description of Implementation Strategy

An implementation strategy was not provided.

Implementation Tools

Clinical Algorithm

Foreign Language Translations

Patient Resources

Staff Training/Competency Material

For information about availability, see the *Availability of Companion Documents* and *Patient Resources* fields below.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Getting Better

Living with Illness

IOM Domain

Effectiveness

Identifying Information and Availability

Bibliographic Source(s)

University of Michigan Health System. Heart failure - systolic dysfunction. Ann Arbor (MI): University of Michigan Health System; 2013 Aug. 24 p. [36 references]

Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

1999 Aug (revised 2013 Aug)

Guideline Developer(s)

University of Michigan Health System - Academic Institution

Source(s) of Funding

University of Michigan Health System

Guideline Committee

Heart Failure Guideline Team

Composition of Group That Authored the Guideline

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Financial Disclosures/Conflicts of Interest

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Team Member/ Consultant	Company	Relationship
Barry Bleske, PharmD	Boehringer Ingelheim, Otsuka	Speakers bureau
	Otsuka	Research funding
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Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: University of Michigan Health System. Heart failure - systolic dysfunction. Ann Arbor (MI): University of Michigan Health System; 2006 Sep. 18 p. [15 references]

Guideline Availability

Electronic copies: Available from the University of Michigan Health System Web site .

Availability of Companion Documents

Continuing Medical Education (CME) information is available from the University of Michigan Health System Web site .

Patient Resources

The following are available:

- Understanding heart failure: answers to common questions. Ann Arbor (MI): University of Michigan Health System; 2013 Aug. 6 p. Electronic copies: Available in Portable Document Format (PDF) from the University of Michigan Health System (UHMS) Web site . Also available in various foreign language translations from the UMHS Web site .
- My I-SMART diabetes action plan. Ann Arbor (MI): University of Michigan Health System; 2010. 2 p. Electronic copies: Available in PDF from the UHMS Web site .

Please note: This patient information is intended to provide health professionals with information to share with their patients to help them better understand their health and their diagnosed disorders. By providing access to this patient information, it is not the intention of NGC to provide specific medical advice for particular patients. Rather we urge patients and their representatives to review this material and then to consult with a licensed health professional for evaluation of treatment options suitable for them as well as for diagnosis and answers to their personal medical questions. This patient information has been derived and prepared from a guideline for health care professionals included on NGC by the authors or publishers of that original guideline. The patient information is not reviewed by NGC to establish whether or not it accurately reflects the original guideline's content.

NGC Status

This summary was completed by ECRI on August 21, 2000. The information was verified by the guideline developer on November 22, 2000. This summary was updated by ECRI on January 8, 2007. The updated information was verified by the guideline developer on January 19, 2007. This summary was updated by ECRI Institute on September 7, 2007 following the revised U.S. Food and Drug Administration (FDA) advisory on Coumadin (warfarin). This summary was updated by ECRI Institute on January 4, 2010 following the U.S. Food and Drug Administration advisory on Plavix (Clopidogrel). This summary was updated by ECRI Institute on May 17, 2010 following the U.S. Food and Drug Administration advisory on Plavix (clopidogrel). This NGC summary was updated by ECRI Institute on December 12, 2013.

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